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Comparison of the predicted amino acid sequence of the *T. aureum* probe 'TA-PKS-1-consensus' and the homologous region on ORF A of *Schizochytrium* PKS gene cluster (Accession number AAK72879).

Quality: 1269 Length: 525
Ratio: 2.469 Gaps: 10
Percent Similarity: 61.690 Percent Identity: 52.849

Match display thresholds for the alignment(s):

| = IDENTITY
: = 2
. = 1

TA-PKS-1-consensus.pep x aak72879.genpept..

1	LCKTLDLEWPH..VFARSIDIELGANEETAQAIFEEELSCPDLTVREAGY	48
2277	: . : . :.. : :	2326
49	TKDGKRWTTTEARPVGLGKPKQALRSSDVFLVSGGARGITPVCVRELAKSI	98
2327 : . : :	2376
99	SGGTFVLLGRSPL.ADDPAWACGV.EEANIGTAAMAHLKAEFAAGRGPKP	146
2377	. : . : : : : .	2426
147	TPKAHKALVGSVLGAREVLGSLESIRAQGARAELYVSCDVSCAERVKAVVD	196
2427	: : . : .	2476
197	TPRAVTKLVGSVLGAREVRSSIAIEALGGKAIYSSCDVNSAADVAKAVR	245
2477 : : : : : :	2526
246	DLERRVGA.VTGVVHASGVLRDKSVERLELADFEVVYGTKVDGLLNLLQA	295
2527	DAESQLGARVSGIVHASGVLRDRLIEKKLPDEFDAVFGTKVTGLENLLAA	2573
296	: : . .	345
296	VDRPKLRHLVLFSSLAGFHGNQAVYAMANEALNMAFHLETAMPGLSV	295
2527	VDRANLKHMLFSSLAGFHGNVGQSDYAMANEALNKG..LELA.KDVSV	2573

FIG. 1A

2574 KSICFGPWDGGMVTPLQLKKQFQEMGVQIIPREGGADTVARIVLGSSPAEI 2623
346 LVGNWGLPPVVPNASVHKITVRLGGESANPFLSSHTIQGRKVLPMTXALG 395
2624 LVGNWRTPSKKVGSDTITLHRKISAKS.NPFLEDHVIQGRRVLPMTLAIG 2672
396 LLAEAARGLYVGHQVXGIEDAQVFQGVVLDKGATCEVQLRRESSTASPSE 445
2673 SLAETCLGLFPGYSLWAIDDAQLFKGVTVDGDVNCEVTL..TPSTAPSGR 2720
446 VVLSASLNVFAAGKVVPAYRAHVIGASGPRTGGVQLELKDLGVADPAC 495
2721 VNVQATLKTFSKGKLVPAYRAVIVLSNQGAPPANATMQPPSL..DADPAL 2768
496 SVGKGALYDGRTL FHGP AFQYMDEV 520
2769 ...QGSVYDGKTL FHGP AFRGIDDV 2790

FIG.1B

Comparison of the predicted amino acid sequence of the *T. aureum* probe 'TA-PKS-1-consensus' and the homologous region on ORF 5 of *Shewanella* PKS gene cluster (Accession number AAB81123).

Quality: 641 Length: 551
Ratio: 1.233 Gaps: 16
Percent Similarity: 47.379 Percent Identity: 39.919

Match display thresholds for the alignment(s):

| = IDENTITY
: = 2
. = 1

TA--PKS-1-consensus.pep x aab81123.genpept

FIG. 2A

2385 FNWGPWDGGMVNPALKMFTERGVYVIPLKAGAELFATQLLAETGVQLLI 2434
348 G.....NWG..LPPVVPNASVHK.....IT.VRLG 369
| | | | | | | : | ||
2435 GTSMQGGSDTKATETASVKKLNAGEVLSASHPRAGAQKTPLQAVTATRL 2484
370 GESANPFLSSHTIQQRKVLPMTXALGLLAEAARGLYVGHQVXGIEDAQVF 419
|| | : | | | || | : : || | : . | || : | ..
2485 TPSAMVFIEDHRIGGNSVLPTVCAIDWMREAASDM.LGAQVK.VLDYKLL 2532
420 QGVVLDKGATCEVQLRRESSTASPSEVVLSASLNVFAAGKVVPAYRAHVV 469
. | : | : | . | | . | | | | : .. | : | | : | ..
2533 KGIVFETDEPQELTL..ELTPDDSDEATLQALIS..CNGR..PQYKATLI 2576
470 LGASGPRTGGVQLELKDLGVDADPACSVKGALYDGRTL FHGPQFYMDE 519
. : | : | . | . | | | || | | | | | .
2577 SDNADIKQLNKQFDL.....SAKAITTAK.ELYSNGTLFHGPRLQGIQS 2619
520 V 520
|
2620 V 2620

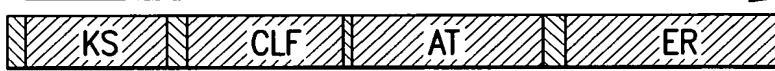
FIG. 2B

Organization of PUFA-PKS genes from *Thraustochytrium aureum* ATCC 34304

ORF A-8748 bp



ORF B-6123 bp



KS=β-keto acyl synthase

MAT=MalonylCoA

transferase

ACP=Acylic carrier protein

KR=Ketoacyl-ACP reductase

AT=Acylic transferase

FIG.3

Sequence ID Nos. and Corresponding Sequences:

SEQ ID NO 1:

5'-AGC GGA TAA CAA TTT CAC ACA GG-3'

SEQ ID NO 2:

CACGAGGCCAAGCATTGAGCAAAGCGCTCAACCAGCAGATCCCAGG
 CGGGCGCGCTGCTCGTGGCGTCTCGCGAATCGACGGACAGCTCG
 GACTTAGCGGAGCTTGCAGAAAGGAAAGGGCTGGGCTGAGGCCGCA
 GAGATTGCTCAGCAAGGAGCCGTGCGAGGCTTGTCAAGACCTTGG
 CCTAGAGTGGCCGCACGTCTCGTGCAGCATCGACATCGAGCTTGG
 CGCGAACGAAAGAAACAGCTGCGCAAGCAATCTTGAGGAGCTCTT
 GCCCGGACCTAACGGTGCAGAAGCAGGATAACACAAAGACGGCAA
 GCGGTGGACGACTGAGGCGCAGCGGTTGGCAAGGCCAAGC
 AGGCACTACGTTCTCGGACGTCTTCTGGTTCTGGTGGGGCGGGGG
 AATTACACCTGTTGCAGTGGCAAATCGATCAGTGGTGG
 CACTTTGTCCTCCTCGGGCGGTCCCTCTCGCTGATGATCCGGCGTGG
 GCTTGCAGGCGTCGAGGAAGCAAACATTGGGACAGCCGCTATGGCGCA
 CCTCAAGGCCAGTCGAGCCGGCGCGGCCGAAGCCGACGCCAA
 AGGCCACAAAGCACTCGTGGGAGCGTCTGGGGCGCGCAAGTC
 CTTGGTTCGCTAGAGAGTATTGCGCCAGGGTGCAGCGCCAGTAC
 GT

SEQ ID NO:3:

TCGCCAACACAAGTTCTGGTGGCAACTGGGGCTGCCCTGTAGTT
 CCTAACCGCGAGCGTGCACAAGATTACTGTGAGGCTGGCGGGAGTC
 TGCAAACCCCTTCCTGTCCTCCCACACGATTCAAGGCAGAAAGGTCTT
 GCCGATGACTGYGGCGCTTGGCTCTCGCTGAGGCGGCTCGAGGGCT
 CTACGTCGGTCACCAAGTAGYCGGGATTGAGGACGCCAACGTTCCA
 GGGAGTCGTGTTGGACAAAGGGCGACGTGTGAGGTCCAGCTCGCC
 GCGAGTCTCGACTGCAAGGCCAACGAGGTTGTGCTGAGTGCTTCGC
 TCAATGTATTGCGGGAAAGGTTGTGCCTGCGTACCGCGCGCATG
 TCGTGCCTGGCGCTTCAGGGCACGCACGGCGTGCAGCTTGAAC
 TGAAAGATTGGCGTGGACGCCGACCCCTGCTGCTCCGTTGGCAAGG
 GTGCGCTGTACGACGGTAGGACGCTGTTCCATGGGCCGGCTTCAGT
 ACATGGATGAGGTTCCCTGGTGCCTGCAGAGCTTGCCTGCGGT
 GCCGTGCGTCCGAGCGCGCTCAGGACCGCGCCAATATGTTCGC
 GCGGAGTGTGTACGACCCGTTCTGAACGACACGGTGTCAAGCTC
 TCCTGTTGGGCCGTCTGGTCAGGGACAGCGCTCGCTACCGAGCA
 ACGTTGAACGAATCTCGTCCACGGCCAGCCGCCAGCGAGGGCGAG
 GTGTAAGTACACCAACGCTCAAGCTGGACAGTGTGCGAGCGGGCGCT
 CGACCCGATTGCAACAGGCCATTCTCCACCGAGCTTGCAGGCTTGGGG
 CGGTCTTGCACTCAGGGCGAGCGAGTGTGGTTCTGAACAAGGCTTT
 CGTATGATGGCTCTGACCCAAAGCGAGTAGAGTACTCTACTCAGTA

FIG.4-1

CTCCTTTCACATACCGGCAGGCAGCGTTGCTGTGGATGGCCGGGG
CTCTTCTGCACGCGCTCC

SEQ ID NO:4:

GAATTCGGCACGAGGCCGGCCTCACGACGCAGGTTGTCGGTCCGCG
CTGCAGGTCTGTCACGCAACGCGGACGGCTCTGTCAGTCCGCAACC
GCATCATCGAAAGATTCCGCGCACGGAGCTCGCGGAGATGTTCATTC
GCCCGCTCCGGAGGCCCTTGTACCAAGTTGGTTGCGTCGGGTGAGA
TTTCGGCCGAGCAGMNGCCTGGCAAACAAGTGCCTGCCGACGAC
ATTGCCGTGAGSAGAACTCGGGCGGCCACCGACAATGCCCGAT
CCATGTCATCCCTCCGCTGATCATCGCGCTCCGCAACAGGCTGCACAA
GGAGTGCGGTTACCCGGCGAGCCTCGCAGTCAGTTGGCGCGGGTGG
CGGGATCGGCTGCCGCTTGCAGCAACTGCAGCCTCAACATGGCGC
CGCCTTCTCGTGCAGGAACAGTCAACCAACTCAGCCGGCAGTCGG
GCACCTGCGACGCAGTGCATSGACTTCAAAAGCAGCTACTCGG
ACATCACAATGGCGCCCGCCGAGATATGTTGACCAGGGGGTTGAG
CTCCAGGTGCTCAAGAAGGGCACCATGTTCCGTCGCGGCCAAGAA
GCTCTACGAGCTGTTGACGTACAACACTCGKTCGACGAGATGCCGC
CGAGGAGCTCGCGCGGTTGAGAAGCAGTYYTCCAAAAGGCCCTCG
CGGSCGTATGGGACGAGACGAAAGACTTTACATCAACCGTCTCCACA
ACGAGGACAAGATCGAACCGCGCAGAAAAGGATGGCAAGCTCAAGAT
GTCGCTCTCGTCCGCTGGTACCTGGCTGAGTCGTTCTGGGCCAAC
AATGGAATCGCCGACCGCGTGGACTATCAAGTGTGGTGCAGGCC
GCGATTGGGCCCTGGAACGACTTTGCCAAGGGATCCTACCTCGACGCC
GAGGTCTCGGCCAGTTCTTGCCTGAGTCAGGTCAACCTGCAGATC
CTCCACGCGCCGCTACATGCAGCCCTCTGGCCGTCAAGCATGACC
CGCGCATCGAGTTGACCTCGAGGACCCGGCTTGGTACGCCAAC
TGCCCGCTCTAAAGCGATGCAGCAACGCACTTTCGAGGGCCGTC
GCTGCAGCAGTGTGCGAACCTGATAGGGTTCTTCAGATTTCAAAAC
AACAAAACAAGTATTGGAATGACAAAAAAAAAAACTCGAG

SEQ ID NO:5:

5'- CTT GTG CAA GAC CTT GGA CCT AGA G-3'

SEQ ID NO:6:

5'-GAA CCT CAT CCA TGT ACT GAA ACG C-3'

SEQ ID NO:7:

TTGTGCAAGA CCTTGGACCT AGAGTGGCCG CACGTCTTCG
CTCGCAGCATCGACATCGAG CTTGGCGCGA ACGAAGAAC
AGCTCGCAA GCAATCTTGAGGAGCTCTC TTGCCCCGGAC
CTAACGGTGC GCGAAGCAGG ATACACCAAAGACGGCAAGC
GGTGGACGAC TGAGGCGCGA CCGGTTGGC TTGGCAAGCC
CAAGCAGGCA CTACGTTCTT CGGACGTCTT CTTGGTTCT
GGTGGGGCGCGGGATTAC ACCTGTTGC GTTCGCGAGT

FIG.4-2

TGGCCAAATC GATCAGTGGTGGCACTTTG TCCTCCTCGG
 GCGGTCCCCT CTCGCTGATG ATCCGGCGTGGGCTTGC
 GTCGAGGAAG CAAACATTGG GACAGCCGCT ATGGCGCACC
 TCAAGGCCGA GTTCGCAGCC GGGCGCGGCC CGAAGCCGAC
 GCCAAAGGCCACAAAGCAC TCGTTGGGAG CGTCCTGGGG
 GCGCGCGAAG TCCTGGTTCGCTAGAGAGT ATTGCGGCC
 AGGGTGCAGCG CGCCGAGTAC GTTCTCGACGTTCTGT
 TGCAGGCGC GTCAAGGCCG TCGTCGACGA TCTCGAGCGA
 CGGGTCGGGG CTGTAAGTGG GGTGTGCAC GCCTCTGGTG
 TTCTCCGAGACAAGTCCGTT GAGCGCTTGG AGCTCGCCGA
 CTTCGAGGTC GTGTACGGCACCAAGGTGGA CGGCCTGCTC
 AACCTGCTGC AGGCCGTGGA CGGCCAAACTCCGGCACT
 TGGTCCCTCTT CAGCTCCCTG GCCGGTTCC ACGGCAACAC
 TGGGCAGGCC GTGTACGCTA TGGCGAATGA GGCGCTGAAC
 AAGATGGCCTTCAATTGGG AACTGCGATG CCTGGCCTCT
 CGGTCAAGAC GATCGGGTTGGACCTTGGG ACGGCAGGCAT
 GGTCAACGAT GCGCTGAAAG CGCACTTGCCTATGGGC
 GTCCAAATTA TTCCGCTCGA CGGYGGCGCG GAGACCGTTT
 CCCGAATCAT CGGGCGTGC TCGCCAACAC AAGTTCTGGT
 TGGCAACTGGGGCTGCCCT CTGTAGTTCC TAACCGCGAGC
 GTGCACAAGA TTACTGTGAGGCTTGGCGGG GAGTCTGCAA
 ACCCTTCCT GTCCTCCAC ACGATTCAAGGCAGAAAGGT
 CTTGCCGATG ACTGYGGCGC TTGGGCTTCT CGCTGAGGCG
 GCTCGAGGGC TCTACGTCGG TCACCAAGTA GYCGGGATTG
 AGGACGCCAAAGTCTCCAG GGAGTCGTGT TGGACAAAGG
 GGCGACGTGT GAGGTCCAGCTTCGCCCGA GTCTCGACT
 GCAAGGCCAA GCGAGGTTGT GCTGAGTGCCTCGCTCAATG
 TATTGCGGC GGGAAAGGTT GTGCCTGCGT ACCGCGCGCA
 TGTGCGCTC GGCGCTTCAG GGCCACGCAC TGGCGCGTG
 CAGCTTGAACGTAAAGATT GGGCGTGGAC GCCGACCCCTG
 CTTGCTCCGT TGGCAAGGGTGCCTGTACG ACGGTAGGAC
 GCTGTTCCAT GGGCCGGCGT TTCAGTACATGGATGAGGTT C

SEQ ID NO:8:

CGCAAGTGCATCCGGCCATCATTGGGCCATCATTGGGCCATCATTGGT
 GTTTGGGCCGCGCTTGCCTGCGATCGTCCGGCGATCAGGTACGAGGCC
 ACGAACCTACGTCGTTGCCCGCTCAGGCTGGTTGGTGCACTTGGA
 CTCTTCTGTGACCTTCATCGTGTGCAGGCAAACCTCGATTGCAGACCC
 GAGACACGGCGAAGGATCCGTGCTGCAAACGCAAGTGGAGTGCCTCG
 AGAGCACCAGCGAGACCAAGAGCCGAGGCAGACAAGGCCAGCAACG
 AGATGGAGACAAAGGACGATCGCGTTGCATCGTGGGATGCGCC
 ATACTGCCTTGCCTGAGTCAGTGCCTGAGTCGTGGGAGGCGATTGCG
 GAGGGGCTCGATTGCCTGCAGGACCTGCCTGCCTGGACCGAGTCGATAT
 CACGGCGTACTACGACCCGAACAAGACAACCAAGGACAAGATCTACT
 GCAAGCGCGCGGCTTCATTCCCAGTATGACTTGCACGCGCGAGT

FIG.4-3

TCGGCCTAACATGTTCCAGATGGAGGACTGGACGCCAACAAACC
 GTGACTTGCTCAAGGTCAAGGAGGCTCTGAGGACGCCGGGGTGG
 GCCCTCACAAAGAAGAAGAACATTGGCTCGTGCCTGGCATCG
 GCGCGGGCAGAAGGCAGGCCACGAGTTACTCCCAGCTCAACTAT
 GTGGTCGTGGAGAAGGTGCTCGCAAGATGAACCTCCCCGACGAGGT
 TGTCGAGGCCGCGTCGAAAGTACAAGGCCAACTTCTGAATGGC
 GCCTCGACTCGTCCCTGGGTTCTGGCAACGTGACGCCGGCGGT
 GCAGCAACGTCTCAACATGGAAGGCATGAACCTGCGTGGACGCT
 GCGTGCGCCAGCTCGCTATCGCATCAAGGTTGCCATTGATGAGCTC
 CTCCACGGGACTGCGACACCAGATTGCCGGTGCACCTGCACCGA
 CAACTCGATCGGGATGTACATGCCCTTCAAAACCCAGTTCTCC
 ACCGACCAAGCGTCAAGGCGTACGACGCCAAGACGAAAGGCATGC
 TCATCGCGAAGGCTCGGCCATGGCGTCAAGCGGTACGCC
 GCCGTTCGGGATGGTGTAGAGATCCATGCCGTACAGGGCATGCC
 TCGTCCAGCGACGCCAGGCTGCTGGCATTACGCACCGACGGTGTG
 GGTCAAGAAAGAGGCACTGCCCGCGTACGCCAGCTGGCGTGG
 CCCCTCACCGTCACGCTGGTGAGGGCACGGCACTGGCACACCC
 TCGGGGACCGGATTGAGCTGACGCCCTGCACAGTCTTGCAGCAG
 CCAACAAAGGCCAAGGAAACAGTCGCGGTGGAAAGCATCAAGTC
 GCAGATCGGTACCTGAAGGCCGTGGCCGGCTTGCCGGTCTCGTCAA
 GGTTGTATGCCCTCAAGCACAAAGACGCTGCCAGACCATCAACG
 TTCACGACCCGCCCGACTGCACGACGGCTGCCCATCCAGGATTG
 GTCTTACATCAACACGATGAACCGGCCCTGGTTACGGCACCTGG
 TCCCCCGCCGTGCAGGCATCTCTAGCTTGGGTTGGCGGCCAACT
 ACCACGCTTTCTCGAAGAGGCCAGCCTGAGCACCGAAGCCGTAT
 CGCATGAACCAAGTCCAACAACCGGTGCTCTGCACGCAAGCTCCG
 TCAGCTCTGCCCTCATCTGCGACGCTCAGGCCACGCCCTCCAGGCC
 GCCGTCTGCCCGAAGCCAGCAAGCACGCAAGACTACCGGCCATCG
 AGCGTTCATGAAGCGTTAACGCTCGCGTGGAGTGCCGGCGCCA
 TGCTCGAATTGGCTTGTGTCGGCAGCGCGGCAGCAACGCTTGCAGT
 GCTCGAGCCGCTCTGCAAAACTCAAGCAGTCGAGTGCACGCTCG
 AATGGACCGCTGCTCCCGAGGGCGTCACGTACCGCTCCGCCGATG
 CACACTCCTGGCAGTGTGCTGCTGTTGCCCATGAACCTGGCCACCG
 TACACGCACATGTTGCTGACGTTGCCATGAACCTGGCCACCG
 AGCGCCGTGCAAGAGATGGATGCCCTCAAGTCACGGCGCAGGCC
 GAAGGCCCTCAGCGAGGTCTGTATCCGCCAAGCCGTACGCTGCAG
 AGCCCGAGCAAGACAACAAGGCCATCTCGATGACGATTAACCG
 CCGGCCCTCATGGCCTGCGCTGCTGGGGCGTTGAGGTGTTCGTCAA
 GCTGGTCTTGCCTGGCAGCCACGTCGCGGGTCATTCTCTGGCGAG
 GGTGCTTGTGCTGCCGCTGGATGCCAAGCCGTGAGGAGCTCTCG
 CTGGTCTGCAAGCAGAGCAAGGCAATGCAAGACGTTCCAAGGCC
 CGAGGGCGTCATGGCAGCTGTACGCCGTGGCTGCCAACTGCAAC
 CGCTGCAAGCGATGGTGCCTGGCTGCCAACTGCAACTGCCAAC
 CAAGTGGTCAATTCCGGCGACAAGACTGCTGTCAGCGTGAATCC
 CGGTGGCAGGCCCTGGCTTCAGGATCATTCCGCTGCAATCGAAGGC

FIG.4-4

GCCTTCCATTACCGCACATGACGGCGGCCAGGCCACGTTCAGGCT
 GCACTGGACAGCCTCAAGATCTCCACCCGACGAACGGGGCGCGCCT
 GTACAACAAACGTTCCGGAAAGACCTGCCGATCCCTGGGTGAACCTCC
 GCGACTGCCTGGCAAGCACATGACAAGTCCGTGCTCTCCAGGCAC
 AGGTAGAGAACATGTACGCTGCCGGGCGCGCATTCTGGAGTTG
 GCCCGAAGCAAGTCCCTCCAAGCTCGTAGGCGAGATTCTCGCCGAC
 AAGTCAGACTTGTGACAGTCGCGGTCAACTCGTCATCGTCCAAGGAC
 AGCGACGTGCAACTCGTGAAGCTGCTGCGAAGCTCGCGGTCTGGC
 GTCCCGTTGGCGAACCTTGAACCTTGGAGCTCTGCGACGCGCGGT
 CTTCGGAATGCCCGCATCCAAGACGACGTTGCGCTGTGAGCG
 ACCTACGTGTCGAACAAGACCCCTGCTGCTAGGGAGAAGGTATGGA
 GGACAACACTGCGACTTTCTCGCTTGCCTCCGGTCCAGCAAGCCA
 AGAGATGGAGCGAGAAATAGCCAACCTTCGCGCTGAGCTGGAGGCCG
 CCCAACGCCAGCTGACACGGCAAAACCCAGCTGCTGAAAGCAA
 GTGCAGGACCCCACCGCTGACCGACAGCGCGATATGATTGCAAGCA
 CCGATCCACACTCGCAGCAATGGTAAGGAATTGAGGCTCTGGCAA
 GTGGTAGTCCTGCGCTGTTCCGTTGCGCTGTGGTGGACACTGCTGT
 CGAAGACGTGCCCTTGCAGCAAGGTCTCGACGCCACCGCCCCAAG
 TCACTTCCGCTCCCATCGCCGAGCTCGCGCGCCGAGGCCGTCGTCA
 TGGAGGTTCTCGCTGCCAAGACTGGCTACGAGGTCGACATGATCGAG
 GCCGACATGCTGCTCGACGCCGAGCTCGGACATCGACTCGGTCAAGCG
 CATTGAGATCCTGGCAGCTGTCCAGGCCAGCTCGGGTGGAGGCCA
 AGGACGTCACGCCAGCTCAGCCGACACGAACAGTGGCGAGGTCGTT
 GACGCCATGAAGGCTGAGATCGGCGGGCAAGCGACCGAGTCGCCCTTC
 GCCGATGGCCCAGCCCCAAGCCTCAGCACCATCACCGTCCCTACTGC
 CTCTGTGCTGCCATAAGCCTGTTACCAAGCTAGTGTGATCCGCC
 AAGCTCGCGCGCCGAAGCGGTGTCATGGAGGTTCTGCCGCCAA
 GACTGGCTACGAGGTCGACATGATCGAGGCTGACATGCTGCTCGACG
 CCGAGCTCGGCATCGACTCGGTCAAGCGCATTGAGATCCTGGCGGCTG
 TCCAAGCTCAGCTCGGGTCGAGGCCAAGGATGTCGACGCCGTCAGC
 CGCACACGCACTGTTGGCGAGGTCGTTGATGCCATGAAGGCTGAGAT
 CGGCGGGCAAGCGACCGAGCGCACCTGCGTCCGTGGCCCAGCCCCAAG
 CCTCAGCACCATCACCGTCCGAACAAACTGCCCTGTGCTGCCATAAGC
 CTGTTGCTGCCAACACTAGCGCCGATCCGCCAAGCTCGCGCGCCG
 AAGCCGTCGTATGGAGGTTCTCGCTGCCAAGACTGGCTACGAGGTCG
 ACATGATCGAGGCTGACATGCTGCTCGACGCCGAGCTGGCATCGACT
 CGGTCAAGCGCATTGAGATCCTGGCGGCTGTCAGGCCAGCTCGGG
 GTCGAGGCCAAGGACGTCGACGCCGTCAGGCCACACGACGGTTGG
 CGAGGTCGTCGAGGCCATGAAGGCTGAGATCGGCGGGCAAGCGAC
 AGTCACCTGCGTCCGTGGCCCAGCCCCAAATCTCTGTGTCCTACG
 CCTCTCGCTGCATCTCTAGTGCCGATCCGCCAAGCTCGCGCGCC
 GAAGCCGTCGTATGGAGGTTCTCGCTGCCAAGACTGGCTACGAGGTC
 GACATGATCGAGGCTGACATGCTGCTCGACGCCGAGCTGGCATCGA
 CTCCGTCAAGCGCATCGAGGATCCTGGCGGCTGTCAGGCCAGCTCGG
 GGTGAGGCCAAGGACGTCGACGCCGTCAGGCCACACGCACTGTTG

FIG.4-5

GCGAGGTCGTTGACGCCATGAAGGCTGAGATCGGCGGGCAAGCGACC
 AGTGCCTGCATCCGTGGCCCAGCCCCAAGCCTCAGCACCGTCGCC
 GTCCGCTACTGCCTCTGTGCTGCCTAACGCCTGTTGCTGCACCAACTAGC
 GCCGATCCGCCAAGCTCGCGCGCCGAAGCCGTCGTATGGAGGT
 TCTCGCTGCCAAGACTGGCTACGAGGTCGACATGATCGAGGCTGACAT
 GCTGCTCGACGCCAGCTCGGCATCGACTCGGTCAAGCGCATCGAGA
 TCCTGGCGGCTGTCCAAGCCCAGCTCGGGTCGAGGCCAAGGACGTC
 GACGCGCTCAGCCGCACACGCACGGTTGGCGAGGTCGTCAGGCCAT
 GAAGGCTGAGATCGCGGGCAAGCGACCAAGTGCACCTGCGTCCATGG
 CCCAGCCCCAAATCTCTGTGTCCCCCTACGCCTCTGCTGCATCTCCTAG
 TGCCGATCCTGCCAAGCTCGCGCGCCGAGGCCGTCGTATGGAGGT
 TCTCGCTGCCAAGACTGGCTACGAGGTCGACATGATCGAGGCCGACA
 TGCTGCTCGACGCCAGCTCGGCATCGACTCGGTCAAGCGCATCGAG
 ATCCTGGCGGCTGTCCAAGCTCAGCTCGGGTCGAGGCCAAGGACGT
 CGACGCGCTCAGCCGCACACGCACGGTTGGCGAGGTCGTTGATGCCA
 TGAAGGCTGAGATCGCGGGCAAGCGACCAAGTGCCTGCATCCGTG
 GCCCAGCCCCAAGCCTCAGCACCGTCGCCGCTACTGCCTCTGCG
 CCTGTTACGCCCTCGCTGCACCAGCTAGTGTGATCCGCCAAGCTC
 GCGCGGCCAAGCCGTCGTATGGAGGTTCTGCCGCCAAGACTGG
 CTACGAGGTCGACATGATCGAGGCTGACATGCTGCTCGACGCCGAGC
 TCGGCATCGACTCCGTCAAGCGGATTGAGATCCTGGCGGCTGTCCAAG
 CCCAGCTCGGGTCGAGGCCAAGGACGTCGACGCCCTCAGCCGACA
 CGCACTGTTGGCGAGGTCGTTGACGCCATGAAGGCTGAGATCGCGG
 GCAAGCGACCAGCGCACCTGCGTCCGTGGCCAGCCCCAAGCCTCAG
 CACCGTCGCCGCTCGCTACTGCCTCTGTGCTGCCTAACGCCTGTTGCTTC
 ACCAGCTAGTGTGATCCGCCAAGCTCGCGCGCCGAAGCGGTG
 TCATGGAGGTTCTCGCTGCCAAGACTGGCTACGAGGTCGACATGATCG
 ACGCTGACATGCTGCTCGACGCCGAGCTCGGCATCGACTCCGTCAAGC
 GCATCGAGATCCTGGCGGCTGTCCAAGCCCAGCTCGGGTCGAGGCC
 AAGGACGTCGACGCCCTCAGCCGCACACGAACGGTTGGCGAGGTCG
 CGAGGCCATGAAGGCTGAGATCGGGGCAGCAGGTCCAACAGATGCA
 CAAGCAGCGTCTGGGCATCTTGGCACGGATGTGAAGACCTGAG
 CCTTGCTCTGCTTCTGTGGTTGAGATTGCTCGTTGCAGCGAACTAGCT
 CTGGAGCGCCGATGGATCGGCCATTCTTATTGTAAGCGATGGATCA
 GCATTGCCGGCGGCTCTGGCTAGTCGACTGGGTCGTGTGCAGTAATC
 CTCACGACCGCAGGGAGACCGACCAATCTGTGCGCTCGACGAAGCA
 CGTTGACATGGAAGGGTGGGGCGAGGAGCAGATCTCGTGCAGCGCTCTG
 AAGCAGTAGAGTCTGATTCGCTCCAGGCAGGCGTCGTGGTGCTTG
 AGCGCGCTCAGAAACAGCTAGGGACCAAGCTTGGCTTGCCCTGCTGC
 TTGCCAAGCATTGAGCAAAGCGCTAACCCAGCAGATCCAGGCCGG
 CGCGCCTGCTCGTGGCGTCTCGCGAATCGACGGAAAGCTCGGACTT
 AGCGGAGCTTGCAGAAAGGAAAGGGCTGGCTGAGGCCAGAGA
 TTGCTCAGCAAGGAGGCCGTCGCGGGCTTGCAAGACCTTGGACCTAG
 AGTGGCCGCACGTCTCGCTCGCAGCATCGACATCGAGCTTGGCGCGA
 ACGAAGAAACAGCTCGCAAGCAATCTTGAGGAGCTCTTGCCCCG

FIG.4-6

GACCTAACGGTGCAGAAGCAGGATAACACAAAGACGGCAAGCGGT
 GGACGACTGAGGCAGCAGCGTGGCAAGCCAAAGCAGGCA
 CTACGTTCTCGGACGTCTTCTGGTTCTGGTGGGGCGCGGGGAATTA
 CACCTGTTGCAGTCGAGTTGGCAAATCGATCAGTGGTGGCAGCTT
 TGTCCCTCCTCGGGCGGTCCCCCTCGCTGATGATCCGGCGTGGCTTGC
 GGCAGTCGAGGAAGCAAACATTGGACAGCCGCTATGGCGCACCTCAA
 GGCGAGTCGAGCCGGCGGGCCGAAGCCGACGCCAAAGGCC
 CACAAAGCACTCGTTGGAGCGTCTGGGGCGCGGAAGTCCTTGG
 TTCGCTAGAGAGTATTGCGCCCAGGGTGCAGCGCCGAGTACGTTT
 CTGCGACGTTCGTGTGCGAGCGCGTCAAGGCCGTCGACGATCT
 CGAGCGACGGGTCGGGCTGTAAGTGGGGTTGTGCACGCCCTGGTGT
 TCTCCGAGACAAGTCGTTGAGCGCTGGAGCTCGCCGACTTCGAGGT
 CGTGTACGGCACCAAGGTGGACGGCCTGCTCACCTGCTGCAGGCCG
 TGGACCGCCCCAAACTCCGGCACTGGCCTCTTCAGCTCCCTGGCCG
 GTTTCCACGGCAACACTGGCAGGCCGTGTACGCTATGGGAATGAG
 GCGCTGAACAAAGATGGCCTCCATTGAAACTGCGATGCCCTGGCCTC
 TCGGTCAAGACGATCGGGTTGGACCTTGGACGGCGCATGGTCAA
 CGATGCGCTGAAAGCGACTTGCCTGCTATGGCGTCAAATTATTCC
 GCTCGACGGCGCGCGAGACCGTTCCCCGAATCATCGGGCGTGCT
 CGCCAACACAAGTTCTGGTGGCAACTGGGGCTGCCCTGTAGTT
 CTAACCGCAGCGTGCACAAGATTACTGTGAGGCTGGCGGGAGTCT
 GCAAACCCCTTCCTGTCCTCGCACACGATTCAAGGCAGAAAGGTCTT
 CCGATGACTGTGGCGCTTGGCTTCGCTGAGGCCGCTCGAGGGCTC
 TACGTCGGTCACCAAGTAGTCGGGATTGAGGACGCCAAGTCTTCCAG
 GGAGTCGTGTTGGACAAAGGGCGACGTGTGAGGTCCAGCTCGCCG
 CGAGTCTCGACTGCAAGCCAAGCGAGGGTTGTGCTGAGTGCTCGCT
 CAATGTATTGCGGGGGAAAGGTTGTGCTGCGTACCGCGCGCATGT
 CGTGTGCGCTTCAGGGCACGCACTGGCGCGTGCAGCTGA
 GAAAGATTGGCGTGGACGCCGACCCCTGCTTGCCTGGCAAGGG
 TGCCTGTACGACGTTGAGGACGCTGTTCCATGGGCCGGCTTCAGTA
 CATGGATGAGGTTCTCGGTGCTCGCCTGCAGAGCTTGCCTGCGGTG
 CCGTGTGTTCCGAGCGCGCTCAGGACCGCCGCAATTGTTCGCG
 CGGAGTGTGTTACGACCCGTTCTGAACGACACGGTGTTCAGCT
 CCTTGTTGGGCCGCTGGTCAGGGACAGCGCTCGCTACCGAGCAA
 CGTTGAACGAATCTCGTTCCACGGCCAGCCGAGCGAGGGCGAGG
 TGTTTACACCACGCTCAAGCTGGACAGTGCTGCGAGCGGGCCGCTCG
 ACCCGATTGCAAAGGCGCAGTTCTCCACCGAGCTGCGGGGGCG
 TCTTGCATCAGGGCGAGCGAGTGTGGTTCTGAACAAGGCTTTCGTT
 TTGA

SEQ ID NO:9:

CAAGCAATCGGCCATCGAGCTGCGCGTTGGAGCTGCCATCGAAATC
 GAAAGCAAGAGGCCACAAGGCTCAGAAAGAGATGAACCAAGGGCGGG
 AGAAATGACGAGGGCGTCTCGGTGGCGCGCGGGACCCATGCCCTGA
 CACCGGGATCGCTGCGTGGCATGGCGGTGAGTATGCAGGGTGC

FIG.4-7

GCGGCAAGGAAGCGTTCTGGGACACGCTCATGAACGGAAAATCAAC
 TCTGCCTGTATCTCAGACGATCGCCTCGGGTCAGCACGACGAGAAGA
 GCACTATGCGCCCGAGAGGGTAAAGTACGCCATACGTTCTGCAACG
 AGAGGTACGGATGCA TCGATCCAAAGTCGACAACGAGCACGACCTG
 CTCCTCGGCCTCGCCCGGGCTCGCCTCAAGACGCGCAGGACAGGCG
 CAGCGACGGCGGCAAGTTGACCCAGCGCAGCTCAAGCGCTGCGGCA
 TTGTCAGCGGCTGCCTGTCCTCCGATGGACAACCTGCAAGGCGAGC
 TGCTCAACCTTACCAAGCCCAGTCTGAGAGGGCGATTGGCAAGCATT
 GCTTCGCGGACCAAACGCCCTGGTCGACCGAACCAGAGCGCTTCAC
 CCGCTGCCGGGGACCCGAGGACCCACCGCGACCCAGCCTCCTCGT
 CGCCGGACAGCTCGGCCTCGGCCCGCTGCACTACTCGCTCGACGCCGC
 CTGCGCCTCGGCCCTTACGTTCTGCGACTCGCTCAGGACCACCTCCTC
 TCGGGCGAGGCTGACTTGATGCTGCGGAGCGACGTGCTTCCAGAG
 CCCTCTTCATCCTGACTGGGTTAGCACGTTCCACGCGATGCCAGTCG
 GTGAGAACGGTGTCTGATGCCGTTCATCGGACACGCAAGGGCTG
 ACGCCCGGGAGGGCGCTGGTATGGTGTCAAGCGCCTCGCGGA
 CGCCGAGCGCAGGGAGACACATCTACGGACGCTTGGAGCCA
 GCTTGAGCAACGCAGGCTGCGGGCTTCTCAAGCCGACCCAGCCA
 AGCGAGGAGGCCTGCTTGAAGCCACCTACGAGCTCGTCGGCGTGCC
 GCCCGAGACGTCCAGTACGTCGAGTGCCACGCCACCGGCACGCCGC
 AGGGCGACACCGTCGAGCTCAAGCCGTAAAGCCTGTTGAGGGC
 GCAAGCCCCGGATCGGGTCCACGAAAGGCAACTCGGACACACCCCT
 CGTCGCGCCGGCTTGCAGGAAATGTGCAAGGTTCTCCTGCAATGGA
 GCGCGCGTGATCCCCCGACCCGGCGTTGACTCTGGCACCCAGAT
 TGATCCCCCTCGTCGTACAGCGCGCTCCGTGGCGATACGCGCGG
 CGGGCGAAACCGCAGGACTCTCCGATCGGATTGGGGCACAA
 ACGCGCACGCCGTCTTGAGGAGCATATCCCTGAGAGGCTCCGCCG
 CAGTACTCTGCCAGCCTCGCCTCGCAGCGGACCAAACCGAAAGCTT
 GCTATCGTCGGATGGATGCCACGTTGGATCCTGAAGGGTCTCTCC
 GCACTAGAACGCTGCCTTACGAGGCAAGGCACGCTGCGGGCCCT
 GCCTGCGAACGCGCTGGCGCTTCTGGGGACGAGTCCTTCTCCA
 CGAGATCGGACTCGAGTGCTCTCCGACGGGTGCTACATTGAGGACGT
 GGATGTGGACTTAAGCGACTCCGACGCCAATGGTCCGGAGGACT
 TGCTCCGGCCGCAACAGCTCCTGGCGTGTGACGATTGACAAGGCC
 ATCCTCGACTCGGGCTTGGCCAAGGGCGCAACGTGGCTGTCCTGTC
 GGCCTCGGGACGGACCTCGAGCTCTACGCCACCGAGCTCGGGTTGC
 GCTTAAGGAGCGTCTCAAGGACTGGTTGCTCTGCCAGGGAGGAG
 CCCTGACGTCTCGCCTGATGAACTATATCAATGATAGCGGAACGTCGA
 CCTCCTACACGTCGTATCGGCAACCTCGCCACGCCGTCTCGT
 CCCAGTGGGCTTCACTGGGCCGTGTCACCGTCACGGAAGGGGCC
 AACTCGGTCCATCGGTGCGCCAGCTGCCAAGTACATGCTCGACCGC
 GCGAGGTCGACGCCGTGGTTGAGGAGTCGACCTGTGCGGGAG
 CGCCGAGGCCTTCTCGTGAGGTGCGCCGATGAGATCTCGAAAA
 GTCAGCGCCCGGCCGCGCCGTTGACCGCGCCGAGACGGCTTCTCG
 CGGGGGAAAGGGTGGCGCCCTCGTCTCAAACGCCGTGACTGACTGT

FIG.4-8

GTGTCTGGCGAGCGAATCTACCGTCCCTGACTCGGTGTCGTGCA
 ACCACGCCGCGCGCCGCTTCGTGCTGCCGAGGGTCGGCGGGTT
 GACCCAGCCAGCATCGACATGGTCGAGCTGAGCGCAGATCCCACCG
 GTTTGTGCGGGCGCCAGGCACCCTGGCTCAGCCTCTGACAGCCGAAGT
 CGAGGTGGGGCGGTGCGGGAAAGTGATCGGGACCGCGGGGAGGGC
 TCTCGAAGCGTGGCGTCGGATCGGTCCCGCCAACGTCGGGGACGC
 AGGGTTGCTTCCGGGGCCGCTGCCCTCGTAAAAACTGCGCTCTGCTT
 GCACAACCGCTACTTGGCGCTACCCCAGGCTGGGATGCGCCTGCTGC
 CGCGTGGATTTGGTGCAGCTGTACGTTGCCGAGTCGCGTGC
 TTGGGTCAAGAACGCCGGCGTGCACGGCACGCCAATTCTGGCGT
 GGACGAAGGCAGGGCGTGTGCTATGGGCTGGTTCTTCGGACGTGCCTGG
 GCAGTACGAGACCGGCAACCGCATCTCCCTCCAGGCCGAGTCGCCCA
 AGCTCTGCTCCTCTCGGCTCCAGACCACGCCGCCCTGCTGGACAAGG
 TGGCGGCCGAGCTCGCAGCCCTTGAGCAAGCCGACGGCTTGAGCGCC
 GCCCGGGCTGCCGTAGACCCTTACTCGGCAGTCGCTCGTCGGTTGC
 GCGGCTGGCAGCGGGCTGACCCCTTGCTGGTGGCTTCGCCCTGCC
 AGCCTCCACAAGGAGCTTGCCTGGCCATCGAGGGATCCCGCCTG
 CATCAAAGCACGGCGCAGTGGCCAGCCCCGGCAGGGAGCTACTTCG
 CCCCCGGAGCCGATCGCAAGCGACCGCGTCGCGTTATGTACGGGAA
 GGACGAAGCCCGTACTCGGGCGTGGCCCGGACCTCCACCGGATCTG
 GCCCGCGCTGCATGAGCGGGTGAACGCCAAGACTGTCAACCTCTGGG
 GTGACGGTGACGCCCTGGCTGCTGCCACGTGCAACCTCGGCCAGGAA
 GAGGAGCAACTCTGCCGCAACTCGACTCGAACCAAGGTTGAGATTT
 CGAACGGCGTGTACATCTCGATGTGCTTGACCGACCTCGCTCGAAGC
 TTGATTGGACTGGGCCCTAAGGCAGCTTGGCTCAGCCTAGGGAG
 GTTCCATGCTCTCGCTCTGAGCGAGTCCAACGTAGACTGTCGGAG
 GAAATGACCGCAGGCTCCGTGCGTCCCCGGTGTGGAACTCGGAGCT
 CGCCGTCGAGTTCAACGCCCTCGAAAGTTGTGGGGGGTGCACCGGG
 GGCACCCGTCGACTCGTCTGGCAAGGTTATGTCGTGCGGCCAACCG
 GGCTCAGGTGGAGCAAGCCATTGGGGAGGACAATCAGTTGTGCGTC
 TCCTGATCGTAACGACTCGCAATCAGTCTGATGCCGGCAAGCCGG
 CGCGTGCAGGCCAGCGTAATTGCTCGCATCGGTCTATTCTCCCCCGCT
 GCAAGTGTGCAAGGCATGGTGGGCACTGTGCCAGGTCTTGCCT
 ACACGAGCGAGATCGGCCATCCACAAATGCTTCGCTCCCATCGC
 AGGACGAAACGGCGGTTGCAAAATGTACTCTAGCGTCTCAAACCTG
 CGCATCGGGCCAGTCGAGGAGAGCCAGATGGGCCAGGCAGTGAGCT
 CGTTTCTGCCGTCAATGAAAGACTTGTGCCAGCTGACTCGCGA
 GTTGCAGACTTCCGGCGATCACCGAGGCGGTTACCAAGCAGGGTCAT
 GACGTGTTGTCGAAGTGGGCCGACCATTACGGTGGCTGCTGTC
 CGCTCCACGCTTGGACCCACTCGGCACACATCGCTGTGGCGATGGAC
 CGCAAGGGTGAGTCAGCTTGGCGAGCTTCTGAAATGCTGGCTACG
 CTTGCGTGCACCGCGTGCAGGCTGGCGCTGGCAGCACAACGATC
 CCCGAGTGGTGGAGCGTTGCAGGCTGGCGCTGGCAGCACAACGATC
 GGGCCAGCCAGAGCAGCGGAACAAGTTTGCGCACGATAGAGGTGA
 ATGGGTTCTACGACCCGGCCGACCGACCATCCCTGAGGCCGTGCA

FIG.4-9

ACAATTCTGCCGGCAACTGCTGCGATTCGCCCTCAAAGCTTGGCGCT
 CCGCACGACTCGCAACCCGAGGCAGGCTGCCCGTGGCGAGGC
 CTCTGTGCCAAGGCGGCCACGAGCTGAGCAAATTGCCAGGACGC
 TTGCCATCGATGCTGCGACTCCGACGTGCGGCCGCTTGCTGGACC
 TGGACGCGCCAATCGCGTCGGCGCTCCTCGCGGCCAAGTCCCG
 CCGTGCCAGTGAGCGCGCTCGGAAGGCCGCTTCGAGCGGCACA
 CGCGTCGATTATGCGCTTACATGGCGCAATGCCAAAGGCGTCG
 CGTCAGCGAGATGGTCATCGCTGGCAAGGCCGATGCTCGCGT
 CATTGGCGGGGGCTTCCCCTGGCGAGGTGAAGAGGCGTTG
 GACAAGATCCAGGCCGCTTGCGCTGCCGAGGGCGTGCCTAACCT
 CATTCACTCGCCGTTCGATCCAAACCITGAGGAGGGCAACGTCGAGCT
 GTTCCTGAGGCAGCGCTTCCGGCTGGTCGAGGCCTTGCCTGTTATGTC
 GGTACGCCGTCGGTGCCTACCGAGTCGCCGACTCGAGCGAG
 GCCCTGGCGGGACGCCCGAGTGCTGAACCGCGTATTGGCAAGGTG
 AGCCGTGCGGAGCTCGCAGAAATGTITATGCCGCCCTCCGCCG
 ATCGTCTCCAAGCTCCTGCCAGGGCCTGGTCACTGAGGAGCAGGC
 GTCACTTGCAAGAGATCGTCCACTGGTTGACGACGTTGCAATCGAAGC
 CGACTCGGGCGGTACACAGACAACCGCCGATCCACGTCGTTGCC
 CGTCGTCCTCGCGCTGCGAGACCGCGTATGCGTGAAGTCAAGTATCC
 AGCCGCCAATCGCGTCCGCGTGGCGCCGGAGGCCGATCGGCTGCC
 CTGCCGCGCGCGAGCTGCGTTCGACATGGCGCAGCATTGTTCTCA
 CGGGCTCGATCAACCAGCTCACGCCAGGCTGGACGAGCGACAGC
 GTGCGTGTGCCCTGCACCGCGCACCTACTCGGACGTGACAATGGCC
 CGGGCGCCGATATGTITGACCAGGGCGTCAAGCTGCAGGTCTGAAG
 CGCGGCACGATGTTCCCGCGCGCAAACAAGCTGTACGAGTTGTT
 ACCACTTACCACTCGCTGGACCGATCCCTGGCTGAGCTGGCTCGC
 CTGGAAAAGCGAGTTCCGATGTCATCGACGAGGT1TGGAACGA
 AACCAAGCAGTTCTACGAGACCCGGCTAACAAACCCGCCAAGGTTG
 CCCGGCGGAGCGCGACCCCAAGCTCAAGATGTCGCTCTGCTTCCG
 GGTACTTGTGAAAAGCTCAAGTGGCATCGACCTGGACAAGTTGG
 CGCGAGCTGGACTACCAGGTCTGGTGCAGGCCACGATTGGCGCTT
 AACGAGTTCGTAAGGGTCCAGCCTCGACGCCAGGCTGCGGGGG
 CGGGTTCTTGCCTGCGTTGCGCTTAACCAGGAGATATTATGTCG
 GCTTACGAGCAGCAGTGGCGCTTATGCTGCTGCCGGAA
 AGCGCGGACCGCGTGGCGTACACGGTTGCCAGAGATAG

SEQ ID NO:10:

RKCIRPSLGHWAIIGVLRALRIVRPIRYEATNLRLPRSGWLVALGLFCD
 LSSCAGKLDLQTRDTAKDPCCRKWSASRAPPRPRAEADKASNEMETKD
 DRVAIVGMSAILPCGESVRESWEAIREGLDCLQDLPADRVDTIAYDPNKT
 TKDKIYCKRGGFPIEYDFDAREFGLNMFQMEDSDANQTVTLLKVKEALED
 AGVEPFTKKKNIGCVLGIGGGQKASHEFYSLNYVVVEKVLRKMNLPDE
 VVEAAVEKYKANFPEWRLDSFPGFLGNVTAGRCNSVFMEGMNCVVDA
 ACASSLIAIKVAIDELLHGDCDTMIAGATCTNSIGMYMAFSKTPVSTDQ
 SVKAYDAKTKGMLIGEWSAMVVLKRYADAVRDGDEIHAVIRACASSSDGK

FIG.4-10

AAGIYAPTVSGQEEALRRA YARAGVDPSTVL VEGHGTGTPVGDRIELTAL
 RNVFDAANKGRKETVAVGSIKSQIGHLKAVAGFAGLVKVVMA LKHKTLP
 QTINVHDPPALHDGSPIQDSSL YINTMNRPWFTAPGVPRRAGISSFGFGGA
 NYHAVLEEAPEHAKPYRMNQVPQPVLLHASSASALASICDAQADALQA
 AVSPEASKHADYRAIVAFHEAFKLRAGVAGHARIGFVSGSAAATLAVLR
 AASAKLKQSSATLEWTLLREGVTYRSAAMHTPGSVAALFAGQGAQYTHM
 FADVAMNWPPFRSAVQEMDAAQVTAAPKRLSEVLYPRKPYAAEPEQD
 NKAISMTINSQPALMACAAGAFEVFRQAGLAPDHVAGHSLGEFGALLAA
 GCASREELFRLVCSRAKAMQDVPKPSEGVMMAVIGRGADKLTQGDGAW
 LANCNSPSQVVISGDKTAVERESSRLAGLGFRRIPLACECEGA FHSPHMTAAQ
 ATFQAALDSLKISTPTNGARLYNNVSGKTCRSLGELRDCLGKHMTSPVLFQ
 AQVENMYAAGARIFVEFGPKQVLSKLVGEILADKSDFVTAVVNSSSSKDSD
 VQLREAAAKLAVLGVPLANFDPWELCDARRLRECPRSKTLRLSAATYVS
 NKTLaAREKVMEDNCFSSLFASGPASQEMEREIANLRAELEAAQRQLDT
 AKTQLARKQVQDPTADRQRDMIAKHRSTLAAMVKEFEALASGSPCAVPF
 APVVDTAVEDVPFADKVSTPPPQVTSAPIELARAEEAVVMEVLA AKTGYE
 VDMIEADMLLDAELGIDSVKRIEILAAVQAQLGVEAKDVL ALSRTVGE
 VVDAMKAEIGGQATSAPSPMAQPQASAPSPSPTASVLPKPVALPASVDPA
 KLARAEEAVVMEVLA AKTGYEVDMIEADMLLDAELGIDSVKRIEILAAVQA
 QLGVEAKDVL ALSRTVGEVVDAMKAEIGGQATSAPASVAQPQASAPS
 PSATTASVLPKPVAAPTSADPAKLARAEEAVVMEVLA AKTGYEVDMIEAD
 MLLDAELGIDSVKRIEILAAVQAQLGVEAKDVL ALSRTVGEVVEAMKA
 EIGGQATSAPASVAQPQISVSPTPLAASPSADPAKLARAEEAVVMEVLA
 AKTGYEVDMIEADMLLDAELGIDSVKRIEILAAVQAQLGVEAKDVL ALSRTV
 VGEVVDAMKAEIGGQATSAPASVAQPQASAPSPSATASVLPKPVAAPTS
 DPAKLARAEEAVVMEVLA AKTGYEVDMIEADMLLDAELGIDSVKRIEILAA
 VQAQLGVEAKDVL ALSRTVGEVVEAMKA EIGGQATSAPASMAQPSQIS
 VSPTPLAASPSADPAKLARAEEAVVMEVLA AKTGYEVDMIEADMLLDAEL
 GIDSVKRIEILAAVQAQLGVEAKDVL ALSRTVGEVVDAMKAEIGGQAT
 SAPASVAQPQASAPSPSATASAPVTPLAAPASVDPAKLARAEEAVVMEVLA
 AKTGYEVDMIEADMLLDAELGIDSVKRIEILAAVQAQLGVEAKDVL ALSR
 TRTVGEVVDAMKAEIGGQATSAPASVAQPQASAPSPSATASVLPKPVASP
 ASVDPAKLARAEEAVVMEVLA AKTGYEVDMIDADM LDAELGIDSVKRIE
 LAAVQAQLGVEAKDVL ALSRTVGEVVEAMKA EIGAAGPNDQAASG
 HLFGTGCEDLSLCSASVVELARCSELALERPMDRPILIVSDGSALPAALASRL
 GSCAVILTTAGETDQSVRSTKHVDMEG WGEADLVRALEAVESRGVPGGV
 VVLERASETARDQLGFALLAKHSSKALNQQIPGGRACFVGVS RIDGKLGL
 SGACAKGKGWAEAAEIAQQGAVAGLCKTLDLEWPHVFARSIDIELGANE
 ETAAQAIFEELSCPDLTVREAGYTKDGKRWTTA RPVGLGKPKQALRSSDV
 FLVSGGARGITPCVRELAKSISGGTFVLLGRSPLADDPAWACGVEEANIG
 TAAMAHLKA EFAAGRGPKPTPKAHKALVGSV LGAREV LGSLESIRAQGA
 RAEYVSCDVSCAERVKAVVDDLERRVGAVTVVHASGVLRDKSVERLELA
 DFEVYVGTKV DGLNLLQAVDRPKLRLVLFSSLAGFH GNTGQAVYAMA
 NEALNKMAFHLETAMPGLSVKTIGFGPWDGGMVNDALKAHFASMGVQI
 IPLDGGAE TVSRIIGACSP TQVLVGNWGLPPVVPNASVHKITVRLGGE SAN

FIG.4-11

PFLSSHTIQGRKVLPMTVALGLLAEAARGLYVGHQVVGIEDAQVFQGVVL
 DKGATCEVQLRRESSTASPSEVVLSASLNVFAAGKVVPAYRAHVVLGASG
 PRTGGVQLEKDLGVDADPACSVKGALYDGRTLFHGPQFYQYMDVELRC
 SPAELAVRCRVVPSAAQDRGQFVSRGVLYDPFLNDTVFQALLVWARLVRD
 SASLPSNVERISFHGQPPSEGEVFYTLKLDAAASGPLDPIAKAQFFLHRAC
 GAVFASGRASVVLNKALSF

SEQ ID NO:11:

QAIGHRAARWSCRSKSKARGHKAQKEMNQGGRNDEGVSVARADPCPDT
 RIAVVGMAVEYAGCRGKEAFWDTLMNGKINSACISDDRLGSARREEHYA
 PERSKYADTCNERYGCIDPKVDNEHDLLGLAAAALQDAQDRRSDDGK
 FDPAQLKRCGIVSGCLSFPMDNLQGELLNLYQAHERRIGKHCADQTPW
 STRTRALHPLPGDPRTHRDPASFVAGQLGLGPLHYSLDAACASALYVRL
 AQDHLLSGEADLMLCGATCFPEPFFILTGFSTFHAMPVGENGSMPFHRD
 TQGLTPGEGGSVMVLKRLADAERGDHIYGTLLGASLSNAGCGLPLKHQ
 PSEEACLKATYELVGVPPRDVQYVECHATGTPQGDTVELQAVKACFEGAS
 PRIGSTKGNFGHTLVAAGFAGMCKVLLAMERGVIPPTPGVDSGTQIDPLV
 VTAALPWPDTGGPKRAGLSAFGF GGTNAHAVFEEHIPSRAPPAVLCQPR
 LGSGPNRKLAIVGMDATFGSLKGLSALEAALYEARHAARPLPAKRWRFLG
 GDESLHIEGLECSPHGCYIEDVDVDFKRLRTPMVPEDLLRPQQLAVSTID
 KAILDGLAKGGNVAVLVGLTDLEYRHRARVALKERLQGLVRSAEGG
 ALTSRLMNYINDSGTSTSYTSTYIGNLVATRVSSQWGFTGPSFTVTEGANSH
 RCAQLAKYMLDRGEVDAVVVAGVDLGSAAEFFVRSRRMQISKSRPAA
 PFDRAADGFFAGEGCGALVFKRLTDCVSGERIYASLDSVVVATTPRAALRA
 AAGSARVDPASIDMVELSADSHRFVRAPGTVAQPLTAEVEVGAVREVIGT
 AGRGSRSVAVGSVRANVGDAAGFASGAAALVKTALCLHNRYLAATPGWD
 APAAGVDFGAELYVCRESRAWVKNAGVARHAAISGVDEGGSCYGLVLSD
 VPGQYETGNRISLQAESPKLLLLSAPDHAAALLDKVAAELAALEQADGLSA
 AAAAVDRLLGESLVGCAAGSGGLTLCLVASPASLHKELALAHRGIPRCIK
 ARRDWASPAGSYFAPEPIASDRVAFMYGEGRSPYCGVGRDLHRIWPALHE
 RVNAKTVNLWGDGDAWLLPRATSAAEEEQLCRNFDSNQVEMFRTGVYIS
 MCLTDLARSLIGLGPKASFGLSLGEVSMMLFALSESNCRLEEMTRRLRASPV
 WNSELAVEFNA RLKWGVAPGVAPVDSFWQGYVVRATRAQVEQAIGEDN
 QFVRLLIVNDSQSVLIAGKPAACEAVIARI GSIPLQVSQGMVGHCAEVLP
 YTSEIGRIHNMLRFPSQDETGGCKMYSSVSNSRIGPVEESQMGPGTELVFSPS
 MEDFVAQLYSRVA DFP AITEAVYQQGHDVFVEVGPDHSRSAAVRSTLGPT
 RRHIAVAMDRKGESAWSQLKMLATLASHRVPGLDLSSMYHPAVVERCR
 LALAAQRSGQPEQRNKFLRTIEVNGFYDPADATIPEAVATILPATAAISPPK
 LGAPHDSQPEAEARPVGEASVPRRATSSSKLARTLAIDACDSDVRAALLDL
 DAPIAVGGSSRAQVPPCPVSALGSAAFRAAHGVDYALYMGAMAKGVASA
 EMVIAAGKARMLASFAGGLPLGEVEEALDKIQAALPEGPFAVNLIHSPFD
 PNLEEGNVELFLRRGIRLVEASAFMSVTPSLVRYRVA GLERGP GGTARVLN
 RVIGKVSRAELAEMFMRPPPAAIVSKLLAQGLVTEEQASLAEIVPLVDDVAI
 EADSGGHTDNRPIHVVLVPLVLA LRDRVMRECKYPAANRVVGAGGGIGC
 PAAARA AFDMGA AFVLTGSINQLTRQAGTSDSVRAALARATYSDVTMAP

FIG.4-12

AADMFDQGVKLQVLKRGTMFPARANKLYELFTTYQSLDAIPRAELARLEK
 RVFRMSIDEVWNETKQFYETRLNNPAKVARAERDPKLKMSLCFRWYLSKS
 SKWASTGQVGRRELQVWCGPTIGAFNEFVKGSSLDAEACGGRFPCVVRR
 NQEILCGAAYEQRLARFMLLAGRESADALAYTVAEAR

SEQ ID NO:12:

ATGGAGACAAAGGACGATCGCGTTGCGATCGTGGCATGTCGGCCAT
 ACTGCCCTGCGGTGAGTCAGTGCAGCGAGTCGTGGGAGGCATTGCG
 AGGGGCTCGATTGCCTGCAGGACCTGCCTGCAGGACCGAGTCGATATC
 ACGCGTACTACGACCCGAACAAGACAACCAAGGACAAGATCTACT
 GCAAGCGCGCGGCTTCATTCCGAGTATGACTTGACGCGCGAGT
 TCGGCCTCAACATGTTCCAGATGGAGGACTCGGACGCCAACCAACC
 GTGACTTTGCTCAAGGTCAAGGAGGCTCTGAGGACGCCGGGGTGG
 GCCCTTCACAAAGAAGAAGAACATTGGCTGCGTGCTGGCATCG
 GCAGCGGGCAGAAGGCGAGCCACGAGTTTACTCCCACACTAAT
 GTGGTCGTGGAGAAGGTGCTCGCAAGATGAACCTCCCCGACGAGGT
 TGTGAGGCCGCGTCGAAAAGTACAAGGCCACTTCCCTGAATGGC
 GCCTCGACTCGTCCCTGGGTTCTGGCAACGTGACCGCCGGCGGT
 GCAGCAACGTCTTCAACATGGAAGGCATGAACTGCGTCGTGGACGCT
 GCGTGCGCCAGCTCGCTATCGCGATCAAGGTTGCCATTGATGAGCTC
 CTCCACGGGGACTGCGACACCATGATTGCCGTGCGACCTGCACCGA
 CAACTCGATGGGATGTACATGGCCTTCAAAACCCCAGTTCTCC
 ACCGACCAAGCGTCAAGGCGTACGACGCCAGACGAAAGGCATGC
 TCATCGCGAAGGCTCGGCCATGGTCGTGCTCAAGCGGTACGCGGAC
 GCCGTTGGATGGTGTGAGATCCATGCCGTATCAGGGCATGCGCC
 TCGTCCAGCGACGGCAAGGCTGCTGGCATTTACGCACCGACGGTGTG
 GGTCAAGAAGAGGCCTGCGCGCGTACGCCAGCTGGCGTGG
 CCCCTCCACCGTCACGCTGGAGGGCCACGGCACTGGCACACCCG
 TCGGGGACCGGATTGAGCTGACCGCCTGCGCAACGTCTTGACGCAG
 CCAACAAAGGCCGCAAGGAAACAGTCGCGGTGGAAAGCATCAAGTC
 GCAGATCGGTACCTGAAGGCCGTGGCCGGCTTGCCGGTCTGTCAA
 GGTTGTATGCCCTCAAGACAAGACGCTGCCGACACCATCAACG
 TTCACGACCCGCCGACTGCACGACGGCTGCCCATCCAGGATTG
 GTCTTACATCAACACGATGAACCGGCCCTGGTTACGGCACCTGGCG
 TCCCCCGCGTGCAGGCATCTCTAGCTTGGTTGGCGGCCAACT
 ACCACGCTGTTCTCGAAGAGGCCGAGCCTGAGCACCGAAGCCGTAT
 CGCATGAACCAAGTTCCACAACCGGTGCTTGCACGCAAGCTCCGCG
 TCAGCTTT

SEQ ID NO:13:

METKDDRVAIVGMSAILPCGESVRESWEAIREGLDCLQDLPADRVDITAYY
 DPNRGGFIPEYDFDAREFGLNMFQMEDSDANQTVLLKVKEALEDAGVEP
 FTK
 KKKNIGCVLGIGGGQKASHEFYSRLNYVVVEKVLKMNLPDEVVEAAVEK
 YKANFPEWRLDSFPGLGNV TAGRCNSNVFN

FIG.4-13

MEGMNCVVDAACASSLIAIK
 VAIDELLHGDCDTMIAGATCTNSIGMYMAFSKTPVFSTDQSVKAYDAKT
 KGMLIGEWSAMVVLKRYADAVRDGDEIHAVIRACASSSDGKAAGIYAPTV
 SGQEEALRRAYARAGVDPSTVTLVEGHGTGTPVGDRIELTALRNVFDAAN
 KGRKETVAVG SIKSQIGHLK
 AVAGFAGLVKVVMAKHKTLPTINVHDPP
 ALHDGSPIQDSSLYINTMNRPWFTAPGVPRRAGISSFGFGGANYHAVLEE
 AEPEHAKPYRMNQVQPVLLHASSASAL

SEQ ID NO:14:

CAGTCGAGTGCAGCGCTCGAATGGACCCCTGCTCCCGAGGGCGTCAC
 GTACCGCTCCGCCGCGATGCACACTCCTGGCAGTGTGCTGCTCTGTT
 GCCGGGCAAGGCGCGCAGTACACGCACATGTTGCTGACGTTGCCAT
 GAACTGGCCACCCTTCGAAGCGCCGTGCAAGAGATGGATGCCGCTC
 AAGTCACGGCGGCAGCGCCGAAGCGCCTCAGCGAGGTCCGTATCCG
 CGCAAGCCGTACGCTGCAGAGCCCCGAGCAAGACAAACAAGGCCATCTC
 GATGACGATTAACCGCAACCGGCCCTATGGCCTGCGCTGCTGGGGC
 GTTGAGGTGTTCGTCAAGCTGGCTTGCGCTGGATGCGCAAGC
 CGTGAGGAGCTTCCGTCTGGTCTGCAGCAGAGCGAAGGCAATGCA
 AGACGTTCCAAGCCAAGCGAGGGCGTATGGCAGCTGTATGGCC
 GTGGTGCTGACAAGCTCACGCTGCAAGGGATGGTGCCTGGCTTGC
 ACTGCAACTCGCAAGCCAAGTGGCATTTCCGGGACAAGACTGCT
 GTCGAGCGTGAATCCAGCCGGTTGGCAGGCCTGGCTCAGGATCATT
 CCGCTTGCATGCGAAGGCCTTCATTACCGCACATGACGGCGGCC
 CAGGCCACGTTCAAGGCTGCACTGGACAGCCTCAAGATCTCACC
 ACGAACGGGCGCCGTACAACAACGTTCCGGAAAGACCTGCC
 ATCCCTGGGTGAACCTCGCAGTGCCTGGCAAGCACATGACAAGTC
 CTGTGCTCTCCAGGCACAGGTAGAGAACATGTACGCTGCCGGGCG
 CGCATTTCGTGGAGTTGGCCGAAGCAAGTCCTCTCCAAGCTCGTA
 GGCGAGATTCTCGCCGACAAGTCAGACTTGTGACAGTCGCGGTCAAC
 TCGTCATCGCCAAGGACAGCGACGTGCAACTCGTGAAGCTGCTGCG
 AAGCTCGCGGTCTGGCTCCCGTTGGCGAACCTTGACCCCTGGGAG
 CTCTGCGACCGCGCGCTTGCAGCAGCTACGTGTCGAACAAGACCC
 GTTGCCTGTCTGCAGCAGCTACGTGTCGAACAAGACCC
 TAGGGAGAAGGTATGGAGGACAACGTGCACTTCTCGCTTTGC
 CTCCGGTCCAGCAAGCCAAGAGATGGAGCGAGAAATAGCCAACCTTC
 GCGCTGAGCTGGAGGCGGCCAACGCCAGCTGACACGGCCAAA

SEQ ID NO:15:

QSSATLEWTLREGVTYRSAAMHTPGSVAALFAGQGAQYTHMFADVAM
 NWPPFRSAVQEMDAAQVTAAPKRLSEVLYPRKPYAAEPEQDNKAISMTI
 NSQPALMACAAGAFEVFRQAGLAPDHVAGHSLGEFGALLAAGCASREEL
 FRLVCSRAKAMQDVPKPSEGVMIAVIGRGADKLTQGDGAWLNCNSP
 SQVVISGDKTAVERESSRLAGLGRIPLACEGAFHSPHMTAAQATFQAAL

FIG.4-14

20/25

DSLKISTPTNGARLYNNVSGKTCRSLGELRDCLGKHMTSPVLFQAQVENM
YAAGARIFVEFGPKQVLSKLVGEILADKSDFVTAVNSSSKDSDVQLREA
AAKLAVLGVPLANFDPWELCDARRLRECPRSKTTLRLSAATYVSNKTAA
REKVMEDNCFSSLFASGPASQEMEREIANLRAELEAAQRQLDTAK

SEQ ID NO:16:

CAAGTCACTTCCGCTCCCATCGCCGAGCTCGCGCGCCGAGGCCGTC
GTCATGGAGGTTCTCGCTGCCAAGACTGGCTACGAGGTCGACATGATC
GAGGCCGACATGCTGCTCGACGCCGAGCTCGGCATCGACTCGGTCAA
GCGCATTGAGATCCTGGCAGCTGCCAGGCCAGCTCGGGTCGAGG
CCAAGGACGTCGACCGCCTCAGCCGACACGAACAGTTGGCGAGGTC
GTTGACGCCATGAAGGCTGAGATCGGCCGG

SEQ ID NO:17:

QVTSAPIAELARAEEVMEVLAAKTGYEVDMIEADMLLAELGIDSVKRIE
ILAAVQAQLGVEAKDVLDSLRTTVGEVVDAMKAEIGG

SEQ ID NO:18:

CATCTCTTGGCACGGATGTAAAGACCTGAGCCTTGCTCTGCTTCTG
TGGTTGAGATTGCTCGTTGCAGCGAACTAGCTCTGGAGCGCCGATGG
ATCGGCCATTCTTATTGTAAGCGATGGATCAGCATTGCCGGCGGCTC
TGGCTAGTCGACTGGGTCGTGCAAGTAATCCTCACGACCGCAGGCG
AGACCGACCAATCTGTGCGCTCGACGAAGCACGTTGACATGGAAGGG
TGGGGCGAGGCAGATCTCGTGCCTCTTGAAGCAGTAGAGTCG
ATTCGCGTCCCAGGCCGCGTCGTGGTGCCTGAGCGCGCCTCAGAAC
AGCTAGGGACCAGCTGGCTTGCCCTGCTGCTGCCAACGATTGAG
CAAAGCGCTCAACCAGCAGATCCCAGGCAGGCCGCGCCTGCTCG
GCGTCTCGGAATCGACGGAAAGCTCGGACTTAGCGGAGCTTGC
AAAGGAAAGGGCTGGCTGAGGCCGAGAGATTGCTCAGCAAGGAG
CCGTCGCGGGCTTGCAAGACCTGGACCTAGAGTGGCCGACGTCT
TCGCTCGCAGCATCGACATCGAGCTTGGCGCAACGAAGAACAGCT
GCGCAAGCAATCTTGAGGAGCTCTTGGCCGGACCTAACGGTGC
GAAGCAGGATAACACCAAAAGACGGCAAGCGGTGGACACTGAGGCG
GACCGGTTGGCTTGCAAGCCAAAGCAGGCACTACGTTCTCG
GTCTCTTGGTTCTGGTGGCGCGGGAAATTACACCTGTTGCG
GCGAGTTGGCAAATCGATCAGTGGTGGCACTTTGTCCTCCTCG
GGTCCCTCTCGCTGATGATCCGGCGTGGCTTGCGCGTCGAGGAAG
CAAACATTGGACAGCCGCTATGGCGCACCTCAAGGCCAGTC
GCCGGCGCGCCGAAGCCGACGCCAAAGGCCACAAAGCACTCG
TTGGGAGCGCTCTGGGGCGCGAAGTCCTGGTTCGCTAGAGAGTA
TTCGCGCCCAGGGTGCAGCGCCGAGTACGTTCTGCGACGTTCG
GTGCGGAGCGCGTCAAGGCCGTCGACGATCTCGAGCGACGGTC
GGGGCTGTAACTGGGGTTGTGCACGCCCTGGTGTCTCCGAGACAAG
TCCGTTGAGCGCTTGGAGCTCGCCACTCGAGGTCGTACGGCACC
AAGGTGGACGGCCTGCTCAACCTGCTGCAGGCCGTGGACCGCCCCAA

FIG.4-15

ACTCCGGCACTGGTCCTCTCAGCTCCCTGGCCGGTTCCACGGCAAC
 ACTGGGCAGGCCGTGTACGCTATGGCGAATGAGGCCTGAACAAAGAT
 GGCCTTCAATTGGAAACTCGCATGCCCTCGCTCAAGACGAT
 CGGGTTGGACCTTGGACGGCGGCATGGTCAACGATGCGCTGAAAG
 CGCACTTGCCTATGGCGTCAAATTATCCGCTCGACGGCG
 CGGAGACCCTTCCGAATCATCGGGCGTGTGCCAACACAAGTTC
 TGGTGGCAACTGGGGCTGCCCCCTGTAGTTCTAACCGAGCGTGC
 ACAAGATTACTGTGAGGCTTGGCGGGAGTCTGCAAACCCCTTCTGT
 CCTCGCACACGATTCAAGGCAGAAAGGTCTGCCATGACTGTGGCG
 CTTGGGCTTCTCGCTGAGGCAGGCTCGAGGGCTTACGTGGTCACCAA
 GTAGTCGGATTGAGGACGCCAAGTCTCCAGGGAGTCGTGTTGGAC
 AAAGGGCGACGTGTGAGGTCCAGCCGCGAGTCTCGACTGC
 AAGCCAAGCGAGGTTGTGCTGAGTGTGCTCAATGTATTGCGGC
 GGGAAAGGTTGTGCTCGTACCGCGCGATGTCGTGCTGGCGCTTC
 AGGGCCACGCACTGGCGCGTGCAGCTGAAGTAAAGATTGGCG
 TGGACGCCACCCTGCTTGTCCGGCAAGGGTGCCTGTACGACG
 GTAGGACGCTGTTCCATGGGCCGGCTTCAGTACATGGAATGAGGTT
 TTCGGTGCTCGCTGCAGAGCTGCCGTGCGGTGCCGTGTTCCGA
 GCGCGCTCAGGACCGCGCCAATTGTTCGCGCGAGTGTACG
 ACCCGTTCTGAACGACACGGTTCAAGCTCTCCTGTTGGGCCCG
 TCTGGTCAGGGACAGCGCTCGCTACCGAGCAACGTTGAACGAATCTC
 GTTCCACGGCCAGCCGAGCGAGGGCGAGGTGTTAACACCACGC
 TCAAGCTGGACAGTGCAGCGAGCGGGCGCTGACCCGATTGCAAAG
 GCGCAGTTCTCCTCCACCGAGCTGCCGGTCTTGCATCAGGG
 CGAGCGAGTGTGGTTCTGAACAAGGCTTTCTGTT

SEQ ID NO:19:

ASGHLFGTGCEDLSLCSASVVEIARCSELALERPMDRPILIVSDGSALPAAL
 ASRLGSCAVILTTAGETDQSVRSTKHVDMEWGEADLVRALEAVESRFGV
 PGGVVVLERASETARDQLGFALLLAHSSKALNQQIPGGRACFVGVSRIDG
 KLGLSGACAKKGWAEAAEIAQQGAVAGLCKTLDLEWPHVFARSIDIEL
 GANEETAA
 QAIFEELSCPDLTVREAGYTKDGKRWTTEARPVGLGPKQALRSSDVFLV
 SGGARGITPVCVRELAKSISGGTFVLLGRSPLADDPAWACGVEEANIGTA
 AMAHLKAFAAAGRGPKPTPKAHKALVGSVLGAREVLGSLESIRAQGARA
 E
 YVSCDVSCAERVKA
 VVDDLERRVGAVTGVVHASGVLRDKSVERLEADFE
 VVYGTKVDGLNLLQAVDRPKLRHVLFSSLAGFHGNTQAVYAMANE
 AL
 NKMAFHLETAMPGLSVKTIGFGPWDGGMVNDALKAHFASMGVQIPLDG
 G
 AETVSRTIGACSPQVLVGNWGLPPVVPNASVHKITVRLGGESANPFLSS
 HTIQGRKVLPMTVALGLLAEAARGLYVGHQVVGIEDAQVFQGVVLDKG
 T
 CEVQLRRESSTASPSEVVLSASLNFAAGKVVPAYRAHVVLGASGRTGG

FIG.4-16

VQLELKDLGVADPACSVKGALYDGRTLHGPQAFQYMDEVLRCSPEAL
 A
 VRCRVVPSAAQDRGQFVSRGVLYDPFLNDTVFQALLVWARLVRDSASLPS
 NVERISFHGQPPSEGEVFYTLKLDAAASCPLDPIAKAQFFLHRACGAVF
 ASGRASVVLNKALSF

SEQ ID NO:20:

ATGAACCAGGGCGGGAGAAATGACGAGGGCGTCTCGGTGGCGCGCG
 GACCCATGCCCTGACACGCGGATCGCTGTCGTGGCATCGCGGTGAGTA
 TGCAGGGTGCCCGCAAGGAAGCGTTCTGGGACACGCTCATGAACGGC
 AAAATCAACTCTGCCTGTATCTCAGACGATCGCCTCGGGTCAGCACGACG
 AGAAGAGCACTATGCGCCCGAGAGGTCAAAGTACGCCGATACGTTCTGC
 AACGAGAGGTACGGATGCATCGATCCAAAGTCGACAACGAGCACGAC
 CTGCTCCTCGGCCTGCCCGCTCGCTCAAGACGCGCAGGACAGGCG
 CAGCGACGGCGGCAAGTCGACCCAGCGCAGCTCAAGCGCTGCCGATT
 GTCAGCGGCTGCCTGTCCTCCGATGGACAACCTGCAAGGCGAGCTGCT
 CAACCTTACCAAGCCCAGTGTGAGAGGGCGATTGGCAAGCATTGCTTCG
 CGGACCAAACGCCCTGGTCAGCGAACCGAGCGCTCACCCGCTGCC
 CGGGGACCCGAGGACCCACCGCGACCCAGCCTCCTCGCCGGACAG
 CTCGGCCTCGGCCCCGCTGCACTACTCGCTCGACGCCGCTGCCGCTCGC
 CCTTACGTTCTGCGACTCGCTCAGGACCACCTCCTCTCGGGCGAGGCTG
 ACTTGATGCTGTGCGGAGCGACGTGCTCCAGAGCCCTCTTCATCCTGA
 CTGGGTTAGCACGTTCCACCGCGATGCCAGTCGGTGAGAACGGTGTCTG
 ATGCCGTTCATCGGGACACGCAAGGGCTGACGCCGGAGGGGGCT
 CGGTGATGGTGCTCAAGCGCCTCGCGACGCCGAGCGCAGGGAGACCA
 CATCTACGGGACGCTCTGGAGCCAGCTTGAGCAACGCAAGGCTGCC
 CTTCCCTCAAGCCGACCAGCCAAGCGAGGAGGCTGCTGAAAGCCA
 CCTACGAGCTCGTGGCGTCCGCCCCGAGACGTCAGTACGTCAGTGC
 CACGCCACCGGCACGCCGAGGGCGACACCCTGAGCTCCAAGCGTCA
 AAGCCTGCTTGAGGGCGCAAGCCCCGGATGGGTCCACGAAAGGCAA
 CTTCGGACACACCCCTCGTCGCGGGCTTGCGGGAAATGTGCAAGGTT
 TCCTTGCAATGGAGCGCGGGGTGATCCCCCGACCCGGCGTTGACTCT
 GGCACCCAGATTGATCCCCCTCGTCGTACAGCGCGCTCCGTGCCGGA
 TACGCGCGGGCGAAACGCGCAGGACTCTCCGATTGGATTGG
 GGCACAAACGCGCACGCCGTCTTGAGGAGCATATTCCCTCGAGAGCT

SEQ ID NO:21:

MNQGGRNDEGVVARADPCPDTRIAVVGMAVEYAGCRGKEAFWDTLMNG
 KINSACISDDRLGSARREEHYAPERSKYADTCNERYGCIDPKVDNEHDLLLG
 LAAAALQDAQDRRSDDGGKFDPAQLKRCGIVSGCLSPMDNLQGELLNLYQA
 HAERRIGKHCFAADQTPWSTRTRALHPLPGDPRTHRDPASFVAGQLGLGPLHY
 SLDAACASALYVLRLAQDHLLSGEADLMLCGATCFPEPFILTGFSTFHAMPV
 GENGVSMFPHRDTQGLTPGEGGSVMLKRLADAERDGDHIYGTLLGASLSN
 AGCGLPLKPHQPSEEACLKATYELGVPPRDVQYVECHATGTPQGDTVELQA
 VKACFEGASPRIGSTKGNFGHTLVAAGFAGMCKVLLAMERGVIPPTPGVDSG

FIG.4-17

TQIDPLVVTAALPWPDTRGGPKRAGLSAFGFGGTNAHAVFEEHIPSRA

SEQ ID NO: 22:

CAGCCTCGCCTCGGCAGCGGACCAAACCGAAAGCTTGTATCGTCGGCA
 TGGATGCCACGTTGGATCCTTGAAGGGTCTCTCCGCACTAGAAGCTGCG
 CTTACGAGGAAGGCACGCTGCAGGGCCCTGCCTGCAGACGCTGGC
 GCTTCTGGCGGGGACGAGTCCTTCTCCACGAGATCGGACTCGAGTGC
 TCTCCGCACGGGTGCTACATTGAGGACGTGGATGTGGACTTAAGCGACT
 CCGCACGCCAATGGTGCCGGAGGACTTGCTCCGGCCAACAGCTCCTG
 GCCGTGTCGACGATTGACAAGGCCATCCTCGACTCGGGCTGGCCAAGG
 GCGGCAACGTGGCTGTCTGCGCCCTCGGGACGGACCTCGAGCTCTAC
 CGCCACCGAGCTCGGGTGCCTTAAGGAGCGTCTCAAGGACTGGTTCG
 CTCTGCCGAGGGAGGGAGCCCTGACGTCTCGCCTGATGAACTATATCAATG
 ATAGCGGAACGTCGACCTCTACACGTCGTATATCGGCAACCTCGTCGCC
 ACGCGCGTCTCGTCCCAGTGGGGCTTCACTGGGCCGTCGTTCACCGTCAC
 GGAAGGGGCCAACCTCGGTCCATCGTGCAGCCAGCTCGCCAAGTACATG
 CTCGACCGCGCGAGGTCGACGCCGTCGTGGTGCAGGAGTCGACCTGTG
 CGGGAGCGCCGAGGCCTTCTCGTGGTGCAGGTCGCGCCGATGCAGATCTCGA
 AAAGTCAGCGCCCAGCGCCGCGCTTGCACCGCGCCAGACGGCTCTTC
 GCGGGGGAAAGGGTGCAGCCCTCGTCTCAAACGCCGACTGACTGTGT
 GTCTGGCGAGCGAATCTACCGCGCCCTCGACTCGGTGTCGCAACCCA
 CGCCCGCGCCGCTCTCGTGCAGGGCGCCGCGGGTTGACCCA
 GCCAGCATCGACATGGTCGAGCTGAGCGCAGATTCCCACCGGTTGTGCG
 GGCGCCAGGCACCCTGGCTCAGCCTCTGACAGCCGAAGTCGAGGTCGGG
 GCGGTGCGGGAAAGTGATCGGGACCGCGGGAGGGCTCTGAAGCGTGG
 CCGTCGGATCGGTCCCGCCAACGTCGGGACGCAGGGTTGCTTCCGGG
 GCCGCTGCCCTCGTAAAAACTGCGCTCTGCTTGACAAACCGCTACTTGGC
 GGCTACCCCAGGCTGGATGCGCCTGCTGCCGGCGTGGATTGGTGCCTG
 AGCTGTACGTTGCCCGAGTCGCGTCTGGGTCAAGAACGCCGGCGTT
 GCACGGCACGCCCAATTCTGGCGTGGACGAAGCGGGTCG

SEQ ID NO:23:

QPRLGSGPNRKLAIVGMDATFGSLKGLSALEAALYEARHAARPLPAKRWRFL
 GGDESLHEIGLECSPHGCVIEDVDVDFKRLRTPMVPEDLLRPQQLAVSTIDK
 AILDGLAKGGNVAVLVGLGTDLELYRHRARVALKERLQGLVRSAEGGALTS
 RLMNYINDSGTSTSYTYSYIGNLVA TRVSSQWGFTGPSFTVTEGANSVHRCAQL
 AKYMLDRGEVDAVVVAGVDLGSAAFFVRSRRMQISKSQRPAAPFDRAAD
 GFFAGEGCGALVFKRLTDCVSGERIYASLDSVVVATTPRAALRAAAGSARVDP
 ASIDMVELSADSHRFVRAPGTVAQPLTAEVEVGA REVIGTAGRGSRVAVGS
 VRANVGDAGFASGAAALVKTALCLHNRYLAATPGWDAPAAGVDFGAELYV
 CRESRAWVKNAGVARHAAISGVDEGGS

SEQ ID NO:24:

TGCTATGGGCTGGTCTTCGGACGTGCCTGGCAGTACGAGACCGGCAA

FIG.4-18

CCGCATCTCCCTCCAGGCCGAGTCGCCAAGCTCTGCTCCTCTCGGTCC
 AGACCACGCCGCCTGCTGGACAAGGTGGCGGCCAGCTCGCAGCCCTT
 GAGCAAGCCGACGGCTTGAGCGCCGCCGCGCTGCCGTAGACCGCTTAC
 TCGCGAGTCGCTCGTGGCTGGCAGCGGGCTGGCAGCGGCCGAGCTGACCTT
 TGCTTGGTGGCTTCGCCTGCCAGCCTCCACAAGGAGCTTGCCTGGCCCA
 TCGAGGGATCCCGCGCTGCATCAAAGCACGGCGACTGGGCCAGCCCG
 GCAGGGAGCTACTTCGCCCCGGAGCCGATCGCAAGCGACCGCGTCGCGT
 TCATGTACGGGAAGGACGAAGCCGTACTGCCTGGCTGCCACGTGCAACCTCGC
 CCACCGGATCTGGCCCGCGCTGCATGAGCGGGTGAACGCCAAGACTGTC
 AACCTCTGGGGTACGGTGACGCCCTGGCTGCTGCCACGTGCAACCTCGC
 CGAGGAAGAGGAGCAACTCTGCCCAACTTCGACTCGAACCGAGTTGAG
 ATGTTTCAACGGCGTGTACATCTCGATGTGCTTGACCGACCTCGCTCG
 AAGCTTGATTGGACTGGCCCTAACCGGAGCTTGGCTCAGCCTAGGCG
 AGGTTTCAATGCTCTCGCTTGAGCGAGTCAAACGTAGACTGTCGGAG
 GAAATGACCGCAGGCTCCGTGCGTCCCCGGTGTGGAACTCGGAGCTCG
 CCGTCAGTCAACGCCCTCGAAAGTTGTGGGGGTCGCGCCGGGGC
 ACCCGTCGACTCGTTCTGGCAAGGTTATGTCGTGCGCGCAACCGCGGCTC
 AGGTGGAGCAAGCATTGGGGAGGACAATCAGTTGTGCGTCTCCTGATC
 GTGAACGACTCGCAATCAGCCTGATGCCGGCAAGCCGGCGTGC
 AAGCCGTAATTGCTCGATCGGCTATTCTCCCCGCTGCAAGTGTGCG
 AAGGCATGGTGGGCACTGTGCCGAGGTCTTGCCGTACACGAGCGAGAT
 CGGGCGCATCCACAACATGCTCGCTCCATCGCAGGACGAAACGGGC
 GGTTGCAAAATGTACTCTAGCGTCTCAAACCTCGCGCATCGGCCAGTCGA
 GGAGAGCCAGATGGGCCAGGCAGTGCAGCTGCGAGTTGAGACTTCCGGCGATC
 AAGACTTGTGCCCAGCTGTACTCGCGAGTTGAGACTTCCGGCGATC
 ACCGAGGCGGTTACCAAGCAGGGTACGACGTGTTGCGAAGTGGGCC
 GGACCATTCACGGTCGGCTGCTGTCCGCTCCACGCTGGACCCACTCGC
 GACACATCGCTGTGGCGATGGACCGAACGGTGAGTCAGCTGGTCGA
 GCTTCTGAAAATGCTGGTACGCTTGCACCGCGTGCCGGGCTG

SEQ ID NO:25:

CYGLVLSDVPQYETGNRISLQAESPKLLLLSAPDHAALLDKVAAELAALEQA
 DGLSAAAAAVDRLLGESLVCAGSGGLTLCLVASPASLHKELALAHRGIPR
 CIKARRDWASPAGSYFAPEPIASDRVAFMYGEGRSPYCGVGRDLHRIWPALHE
 RVNAKTVNLWGDGDAWLLPRATSAAEQQLCRNFDSNQVEMFRGTVYISM
 LTDLARSILGLPKASFGLSLGEVSMILFALSESNCRSEEMTRRLRASP
 VWNSEL
 AVEFNALRKLWGVAPGAPVDSFWQGYVVRATRAQVEQAIGEDNQF
 VRLLIV
 NDSQSVLIAGKPAACEAVIARIGSILPPLQVSQLGMVGHCAEVLPY
 TSEIGRIHN
 MLRFPSQDETGGCKMYSSVSNSRIGPVEESQMGPGTEL
 VFSPSMEDFVAQLYSR
 VADFPAITEAVYQQGHDVFVEVGP
 DHSRAAVRSTLGPTRRHIAVAMDRKGE
 SAWSQLKMLATLASHRVPG

SEQ ID NO:26:

CGCACCATCCCTGAGGCCGTCGCAACAATTCTGCCGGCAACTGCTGCGAT
 TTCGCCCTCAAAGCTTGGCGCTCCGACGACTCGCAACCCGAGGGCGGAG

FIG.4-19

GCTGCCCGTGGCGAGGCCTGTGCCAAGGCGGCCACGAGCTGA
 GCAAATTGCCAGGACGCTGCCATCGATGCTGCGACTCCGACGTGCGC
 GCCGCTTGTGGACCTGGACGCCAATCGCGTCGGCGGCTCCTCGCG
 CGCCAAGTCCCAGCGCTGCCAGTGAGCGCGCTCGGAAGCGCCGCCCTTC
 GAGCGGCACACGGCGTCATTATGCGCTCTACATGGCGCAATGGCAA
 AGGCGTCGCGTCAGCGAGATGGTCATCGCTGCTGGCAAGGCCGATG
 CTCGCGTCATTGGCGCGGGGGCTCCCTGGCGAGGTCGAAGAGGC
 GTTGGACAAGATCCAGGCCGCTCTGCCGAGGGCGTTGCCGTCAACC
 TCATTCACTGCCGTTGATCCAAACCTTGAGGAGGGCAACGTCGAGCTG
 TTCCTGAGGCAGCGGTATCCGGCTGGTCGAGGCCTGCGTTCATGTCGGTC
 ACGCCGTCGTTGGTGCCTACCGAGTCGCCGGACTCGAGCGAGGCCTG
 GCGGGACCGCCCGAGTGCTGAACCGCGTATTGCAAGGTGAGCCGTGC
 GGAGCTCGCAGAAATGTTATGCGGCCGCTCCGCCGATCGTCTCCA
 AGCTCCTCGCCCAGGGCCTGGTCACTGAGGAGCAGCGTCACTTGCAGA
 GATCGTCCCACGGTTGACGACGTTGCAATCGAAGCCGACTCGGGCGGT
 ACACAGACAACCGCCGATCCACGTCGTTTGCCGTCGTCCTCGCGCTG
 CGAGACCGCGTCATCGTGAGTGCAAGTATCCAGCCGCAATCGCGTCC
 GCGTGGCGCCGGAGGCAGGGATCGGCTGCCGCGCGAGCTGC
 GTTCGACATGGCGCAGCATTGTTCTCACGGGCTCGATCAACCAGCTCA
 CGCGCCAGGCTGGACGAGCGACAGCGTGCCTGCCGTCACCGC
 GACCTACTCGGACGTGACAATGGCCCCGGCGGCGATAGTTGACAG
 GGCCTCAAGCTGCAGGTCTGAAGCGCGCACGATGTTCCGGCGCG
 CAAACAAGCTGTACGAGTTTCACTTACCACTTACCGAGTCGCTGGACGCGATC
 CCTCGGGCTGAGCTGGCTGCCCTGGAAAAGCGAGTTTCCGATGTCCAT
 CGACGAGGTTTGAACGAAACCAAGCAGTTCTACGAGACCCGGCTCAAC
 AACCCGCCAAGGTTGCCGGGGAGCGCGACCCCAAGCTCAAGATGT
 CGCTCTGCTTCGGTGGTACTTGTGAAAGCTCCAAGTGGCATCGACT
 GGACAAGTTGGCGCGAGCTGGACTACCAGGTCTGGTGGGGCCCCACGA
 TTGGCGCTTCAACGAGTTGCTGAAGGGTCCAGCCTGACGCGGGAGGCT
 TGCGGGGGGCGGTTCTGCGTTGCGCTTAACCAGGAGATATTATG
 TGGCGCTGCTTACGAGCAGCGACTGGCGCGTTCATGCTGCTGCTGGCC
 GGGAAAGCGCGGACCGCTGGCGTACACGGTTGCGGAAGCCAGATAG

SEQ ID NO:27:

ATIPEAVATILPATAISPPKLGAPHDSQPEAEARPVGEASVPRRATSSSKLART
 LAIDACDSDVRAALLLDAPIAVGGSSRAQVPPCPVSALGSAAFRAAHGVDY
 ALYMGAMAKVASAEMVIAAGKARMLASFAGGLPLGEVEEALDKIQAALP
 EGPFAVNLIHSPFDPLLEGNVELFLRRGIRLVEASAFMSVTPSLVRYRAGLE
 RGPGGTARVLRVIGKVSRAELAEMFMRPPAAIVSKLLAQGLVTEEQASLAE
 IVPLVDDVAIEADSGGHTDNRPIHVVLVVLALRDRVMRECKYPAANRVRVG
 AGGGIGCPAAARAADFDMGAAFVLTGSINQLTRQAGTSDSVRAALARATYSDV
 TMAPAAMFDQGVKLQVLKRGTMFPARANKLYELFTTYQSLDAIPRAELRL
 EKRVFRMSIDEVWNETKQFYETRLNNPAKVARAERDPKLKMSLCFRWYLSKS
 SKWASTGQVGRELDYQVWCGPTIGAFNEFVKGSSLDAEACGGRFPCVVRVN
 QEILCGAAYEQRLARFMLLAGRESADALAYTVAEAR

FIG.4-20